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Science and Technology Perspectives

DEVELOPMENTS

Drilling Platform

(PRC) China has produced its first offshore oil production platform. Designed by the Shanghai Offshore Engineering Corporation to meet international technical standards and built by the Dalian Shipyard, the steel platform can produce 4,000 barrels of crude oil and 40,000 cubic meters of natural gas a day. The platform sits astride 23 oil wells sunk 1,680 meters into the bed of Beibu Bay in the South China Sea. It will be operated by the Chengbei Oil Development Corporation of Japan and will begin production this month. (Beijing CHINA DAILY 22 Sep 86) STAT

. . . . . *Continued on Page 1*

FEATURE ARTICLES

REPORTS

PERSPECTIVES selections are based solely on foreign press, books and journals, or radio and television broadcasts. Some of the materials used in this publication will appear as abstracts or translations in FBIS serial reports. Comments and queries regarding this publication may be directed to the Center Chief, to individuals at the numbers listed with items, or to the Science and Technology Center at [redacted] STAT

DEVELOPMENTS

DEVELOPMENTS highlights worldwide S&T events reported in the foreign media. Items followed by an asterisk will be published by FBIS. The contributor's name and telephone number are provided.

Airbus

(France) The maiden flight of the Airbus A-320 is scheduled for the end of February 1987, somewhat earlier than planned. The first aircraft is undergoing preflight testing. Airbus Industrie expects production to increase from two aircraft a month in late 1987-early 1988 to eight aircraft a month by 1990. (Paris AIR & COSMOS 18 Oct 86) STAT

(France) A decline in sales of the Airbus A-300 and A-310 will force Aerospatiale to lay off 17 percent of its 42,000 employees. The company plans to use high severance pay bonuses to induce "voluntary departures." (Paris LE MONDE 10 Oct 86)* Eva L. X2519 [For previous coverage on the possible impact of declining Airbus sales on the French aerospace industry, see SCIENCE AND TECHNOLOGY PERSPECTIVES Vol. 1, No. 10 pp 3-4.]

Antidumping Measures

(EC/Japan) The EC, fearing an influx of Japanese memory components in the wake of a US-Japan antidumping accord, is preparing similar antidumping measures aimed primarily at those Japanese EPROM and DRAM manufacturers who sell their products in Europe at prices far below cost. On 27 October the EC formally challenged the US-Japan accord at the GATT, claiming that the accord violated GATT's antidumping code and that it will lead to Europe's exclusion from the world semiconductor market. (Paris ELECTRONIQUE ACTUALITES 5 Sep 86; Frankfurt/Main FINANCIAL TIMES 28 Oct 86) STAT

Biotechnology

(Brazil) During BIOTECNICA 86, a recent biotechnology fair in Belo Horizonte, the firm Embrabio (Brazilian Biotechnology Company) exhibited a method for rapidly improving the genetic quality of livestock through a system of hyperovulation, artificial insemination, and embryo transfer. The company Bioplanta (Plant Technology Ltd.) demonstrated the inoculation of plants with phosphate-absorbing fungi to enhance phosphate absorption in depleted soil. Brazil reportedly will allocate $100 million for a three-year (1987-89) biotechnology program that will create biotechnology centers in Rio Grande do Sul, Parana, Sao Paulo, Rio de Janeiro, and Planalto Central. Several state governments are also allocating funds for biotechnology research. (Rio de Janeiro JORNAL DO BRASIL 17, 19 Sep 86)* STAT STAT

(Yugoslavia) On 12 September the Jozef Stefan Institute in Ljubljana opened a new facility for molecular biology and biotechnology. The facility was established by the Faculty of Chemistry and Chemical Technology in cooperation with the Boris Kidric Chemical Institute. Its program calls for research in the fields of molecular biology, protein biochemistry, biotechnology, biosynthesis, immunology, bioactive materials, genetic engineering, microbiology, and computer science. (Pristina JEDINSTVO 13 Sep 86 STAT

Fifth-Generation Computer

(France/Japan) An agreement reached by France's INRIA (National Institute for Research in Information Technology and Automation) and Japan's ICOT (Institute for New Generation Computer Technology) during a Tokyo meeting in early October will result in greater cooperation toward development of a fifth-generation computer. Programming languages, machine architectures, and means of machine-man communication through voice and image were discussed. Researchers from the two bodies will meet again next year. The quality of French AI software is given credit for spurring Japanese interest in the joint program. (Paris AFP—AGRA Data Base 9 Oct 86)* Antwerp Unit STAT

Information Sharing

(Brazil/Portugal) A memorandum of understanding was signed on 30 September between Brazil and Portugal to increase the exchange of technical and scientific information. The signatories plan to facilitate this exchange through the establishment of an electronic mail system. The memorandum also provides for joint projects in the areas of biotechnology and information technology. (Lisbon DIARIO DE NOTICIAS 1 Oct 86)* STAT

Metallurgy

(USSR) High-quality steel is being produced from iron ore without blast furnaces in a process developed at the Chemico-Metallurgical Institute of the Kazakh SSR National Academy of Sciences. The new method is an improvement on the advanced direct conversion technology used at the Oskolsk Electrometallurgical Combine. With the new process, the Combine uses iron ore in the form of pellets and agglomerate to produce steel. The technique also permits the use of iron ore concentrate in raw form, thus increasing reactive surfaces and hastening chemical reactions. The byproducts are pure steam and iron. The resulting high-quality steel has possible applications in machine, instrument, and aircraft parts manufacture. The report does not provide further details on the process. (Moscow SOTSIALISTICHESKAYA INDUSTRIYA 28 Sep 86; Moscow MOSCOW NEWS, No 26, 6-13 Jul 86)* STAT

(USSR) The effect of plasma formation (heating gas with a laser) on plating is being studied at the A. Baykov Institute of Metallurgy at the USSR Academy of Sciences. In the experiment, a metal plate is placed in a steel chamber capable of withstanding pressures of up to 200 atmospheres. The chamber is filled with a gas (nitrogen, methane, or carbonic acid) and sealed. A laser beam heats the gas to 20,000°C. At this temperature the gas reacts with the metal plate to form metal nitride or carbide, depending on the gas used. The resulting metal has applications in the production of drilling rig rings, surgical instruments, and parts for agricultural machinery. (Moscow MOSCOW NEWS, No 26, 6-13 Jul 86)* STAT

Nuclear Technology Transfer

(Finland/USSR) The USSR wants to purchase a nuclear power plant simulator from the Finnish manufacturers Imatran Voima and Nokia. Soviet interest was sparked by the companies' development of a highly automated simulator for technical training at the Soviet-built Loviisa nuclear power plant near Helsinki. The Soviets are also interested in having Finnish scientists conduct safety surveys at nuclear power plants near Leningrad. (Helsinki Domestic Service 9 Oct 86) STAT

Patent Bank

(Brazil) The recently created Technological Information Availability Center (Profint) is providing copies of international patents to subscribing Brazilian firms from a patent bank containing some 18 million entries. These firms are free to copy products and processes without paying royalties or fearing penalties because Brazil only recognizes the validity of patents registered in that country. Brazil itself reportedly will issue 75,000 patents this year. (Sao Paulo O ESTADO DE SAO PAULO 29 Aug 86) STAT

R&D Financing

(Argentina) Early in 1986 Argentina's leading banks signed an agreement, dubbed ARGENTEC, to provide loans at favorable rates to domestic scientific and technological firms for research and development, import and assimilate foreign know-how, and export of indigenous technology. The banks involved are the Banco de la Nacion Argentina, Banco Nacional de Desarrollo, Banco de la Provincia de Buenos Aires, Banco de la Provincia de Cordoba, and Banco de Mendoza. (Buenos Aires BOLETIN DE LA SECRETARIA DE CIENCIA Y TECNICA March 1986)* STAT

RACE Phase II

(EC) Following the successful definition phase of the RACE (R&D in Advanced Communications Technologies for Europe) program, the EC Commission has recommended that member countries contribute 800 million ECU to finance the program's second phase, which will run from 1987 to 1991. This phase will focus on the development of common standards and new, cost-effective technologies for broadband communications. The program's continuation, however, may be hampered by the EC's current inability to adopt an overall research program and by the reluctance of some EC countries to share their technological skills. (Paris LE MONDE 21 Oct 86) Antwerp Unit/ STAT

Robotics

(Czechoslovakia) The 1985 robotics automation plan to manufacture 3,108 robots and 1,505 automated workstations has been exceeded with the production of 4,174 robots and 1,565 workstations. The Czechs continue to face high manufacturing costs, spare parts shortages, and installation problems. (Paris MONITEUR DE COMMERCE—ISIS Data Base 2 Jun 86)* Antwerp Unit/ STAT

Scientific Cooperation

(Italy/Poland) Italian and Polish representatives to the Bilateral Scientific and Technological Cooperation Commission in Warsaw have signed a cooperation protocol in the areas of physics, electronics, chemistry, biochemistry, and telecommunications. The protocol covers the period 1986-88 and includes a series of projects for which feasibility studies have been completed. (Rome ANSA 12 Sep 86) STAT

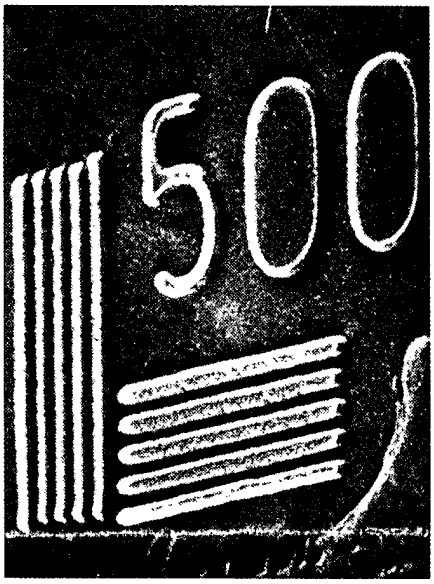
AUSTRIA: "HYPERCHIP" DEVELOPMENT USING ION BEAM LITHOGRAPHY

Key Points: Scientists at Austria's IMS (Ion Microfabrication Systems) have developed an ion beam lithography machine that projects ion beams onto a wafer to produce patterns with sharp, clearly defined edges. The technique represents a major step in the integration and miniaturization of semiconductors.

"Hyperchips" have been experimentally produced using an ion beam lithography machine developed by Drs. Gerhard Stengl and Hans Loeschner at IMS, according to VDI NACHRICHTEN of 25 July. Hyperchips are highly integrated, miniaturized semiconductors able to perform the high-speed calculations required for the development of next-generation computers. Although current electron-beam and X-ray lithography techniques have reduced microstructure line widths to about 1 micron (Mitsubishi claims to have developed a prototype chip with a 0.3-micron pattern using X-ray lithography technology. See SCIENCE AND TECHNOLOGY PERSPECTIVES Vol. 1, No. 8 pp 6-8.), the IMS equipment has produced hyperchips with line widths of "just under 0.1 microns," according to Loeschner. IMS calculations indicate that .01-to-.02-micron line widths are possible.

The process is based on a so-called "duo-plasmatron" developed by IMS (but not further described) and a special lens system. This equipment accelerates and focuses ion beams so that extremely fine and densely packed microstructure patterns are literally "pounded out" of a wafer surface.

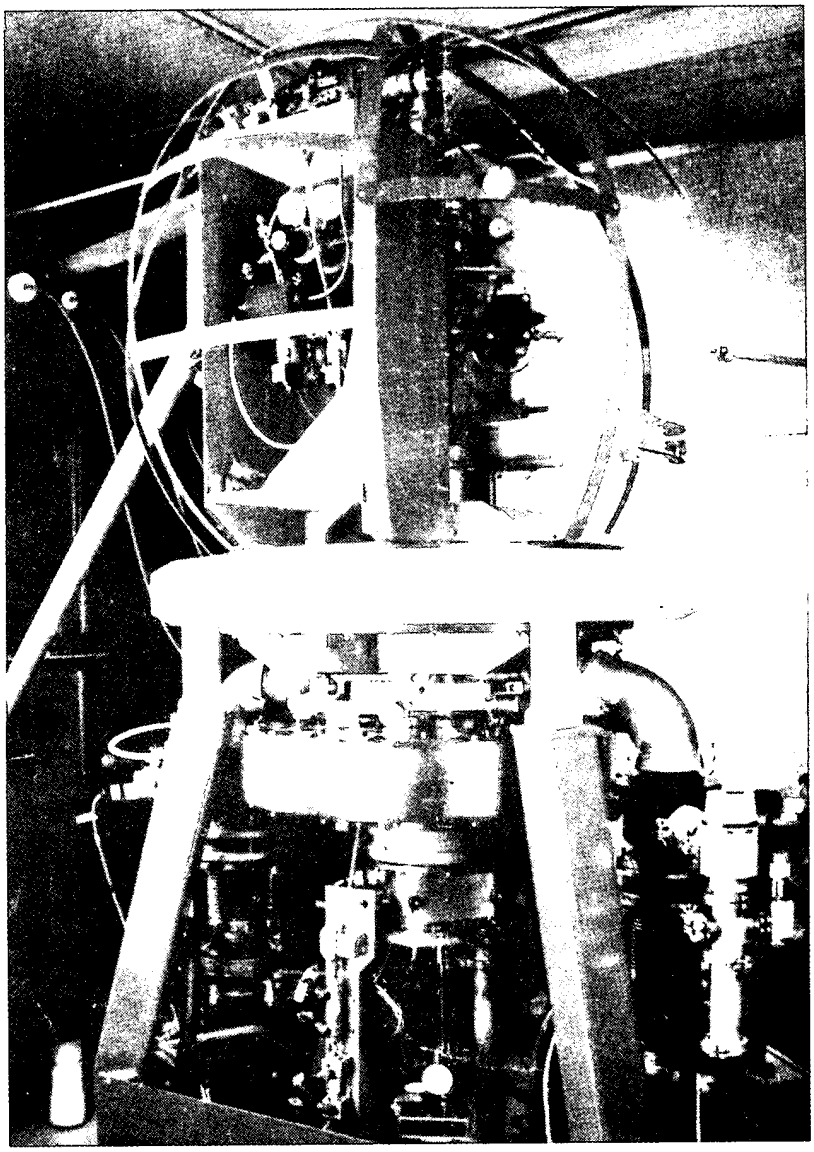
The first step in the process is the creation of a plasma by ionizing helium or hydrogen in a vacuum generated by the duo-plasmatron. By means of an electrical high-tension field, ions are drawn out of the plasma in the form of beams. The beams are then accelerated by an immersion lens through a mask containing a tenfold enlargement of the wafer pattern. In the next phase the ion beams are aligned and shot through a system of projector lenses onto a two-square-millimeter wafer surface. Acceleration and focusing resolve the ions into units akin to the individual dots or picture elements on a photographic print. In the IMS process, the impact of 1,000 ions forms one picture element.



Hyperchip showing line width of 0.2 microns. IMS claims a 0.1-micron capability.

The IMS process is reportedly a major advance in the production of wafer patterns with sharp, clearly defined edges. In conventional processes, the lines created by a mask often have fuzzy edges which merge into one another. This has required broader spaces between lines and a limited number of microstructures on a wafer surface. The IMS process, however, allows increased microstructure density, thereby boosting the level of semiconductor integration and miniaturization.

IMS also claims to have overcome problems inherent in conventional optical systems. Its special series of projector lenses can be "artificially improved," according to IMS, to produce the optical quality needed to focus the ion beams. Inaccuracies in depth of field resulting from adjusting distances between the projector lenses and the wafer are eliminated because the paraxial trajectory of the ion beams allows greater tolerances than in conventional systems.



IMS photo of its ion beam lithography machine.

IMS hopes to sell its DM2.5 million invention to the semiconductor industry. A possible application is in high-speed computing for machine image and speech recognition systems. Eureka is providing IMS, the Technical University of Vienna, Siemens, and the Fraunhofer Institute in Berlin

with Fr34.5 million over the next three to five years to prepare the ion beam lithography machine for cost-effective pilot and series production, according to the Eureka Secretariat in Paris. The machine is tentatively scheduled for commercial use by the early 1990s.

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USSR: EXPERIMENT IN SUPPORT OF LONG-DURATION SPACEFLIGHT

Key Points: A hypokinesia experiment involving long periods of bed rest and restricted physical activity is currently under way at the Biomedical Problems Institute in Moscow. The goal of the one-year study—the longest and most elaborate in a series of such experiments—is to obtain precise data on physiological effects associated with spaceflight. Findings produced by the study will support the recently reaffirmed Soviet goal of extending the duration of cosmonaut missions.

The Soviet manned space program has successfully performed a number of long-duration missions, including a 237-day flight in 1984—the longest single mission to date. With the completion of the latest 125-day flight in July of this year cosmonaut Leonid Kizim became the first person to have spent a total of over one year in orbit. Ten Soviet cosmonauts have now logged over 200 days in space. Of these, four have spent over 300 days in orbit:

Cosmonaut	Number of Flights	Flight Durations (days)	Cumulative Days in Orbit
L. D. Kizim	3	13 + 237 + 125	375
V. V. Ryumin	3	2 + 175 + 185	362
V. A. Solovyev	2	237 + 125	362
V. A. Lyakhov	2	175 + 150	325

As mission durations increase and new mission profiles such as manned interplanetary flights are considered, questions of the medical effects of weightlessness and readaptation to gravity conditions become more acute. One element of the Soviet biomedical support program has involved hypokinesia studies with volunteer experimental subjects. Hypokinesia is known to produce physiological effects similar to those which occur in spaceflight. These include muscle atrophy, changes in cardiovascular function, and demineralization of bone tissue. The first experimental studies in this area began more than 20 years ago in the USSR and other countries. A six-month hypokinesia study was carried out about 10 years ago in the Soviet Union. In 1984 the Soviet press described a four-month study involving 15 experimental subjects (See JPRS-USP-84-004, pp 80-81).

A feature article in the 26 September issue of IZVESTIYA and several earlier press accounts published in August (KOMSOMOLSKAYA PRAVDA, 10 August, and SOTSIALISTICHESKAYA INDUSTRIYA, 20 August) describe a hypokinesia study currently under way at the USSR Ministry of Health's Biomedical Problems Institute in Moscow. The experiment began in April 1986 and is scheduled to continue for an entire year. This project is said to be the largest scale study of this type ever undertaken, not only in terms of duration, but also with regard to the scope of the research program and the amount of technical equipment involved. In addition to the Biomedical Problems Institute, research support is being provided by the All-Union Cardiological Center,the Central Scientific Research Institute of Traumatology and Orthopedics, the Scientific Research Institute of Medical Radiology, and other facilities.

Ten volunteer subjects have been following a strict bed rest regimen with the head inclined at an angle five degrees lower than the feet. The lower position of the head creates a redistribution of blood toward the upper part of the body similar to that which occurs in weightlessness. The subjects are divided into two groups of five. For the first four months of the study one group simply followed the bed rest routine with no use of exercise or other countermeasures. The second group has employed a number of countermeasures from the start of the experiment. These include drugs, vitamins, and two hours of exercise every day, the same exercise schedule followed by cosmonauts on the Salyut station. The subjects use the same type of equipment employed in orbital flights. A bicycle-ergometer and stationary running track have been adapted with counterweight systems so that they can be used while maintaining a horizontal position.

Dr. A. I. Grigoryev, first deputy director of the Biomedical Problems Institute and the scientific director of the current study, has reportedly been involved in medical support for the Soviet space program for many years. According to Grigoryev, the regimen of two hours of physical exercise performed every day by cosmonauts during orbital flight has proven to be effective against cardiovascular and motor-support system deterioration. However, the routine is inconvenient and requires major expenditures of time which could be more profitably spent in other activities. One aim of the present study is to find effective but less time-consuming techniques for achieving the same result.

The 10 subjects are being monitored and tested regularly using precision techniques which would be impossible to use in orbital flight. Examination methods include computer tomography and detailed biochemical testing and analysis of hormonal balance. The subjects are transported periodically by ambulance to the Cardiological Center for special examinations. Except for a few specific references the initial press accounts do not discuss experimental results of the study. According to one commentary, centrifuge experiments have shown that after 100 days of the hypokinesia regimen the experimental subjects could withstand g-loads as well as they did after the first two to three weeks of the experiment. In answer to a question on the issue of calcium loss, Dr Grigoryev states that the subjects are losing about five grams of calcium per month.

A follow-up article in the 5 October KOMSOMOLSKAYA PRAVDA provides some additional details at the halfway point of the experiment. According to this account, some modifications have been introduced into the standard program of physical exercise. The test subjects log about five kilometers on the stationary running track and about ten kilometers on the bicycle-ergometer every day—the same amounts as cosmonauts in orbit—but they exercise with "greater intensity." In addition, they perform a special set of exercises (not described) to prepare them for high physical loads. At the four-month and eight-month points in the experiment special centrifuge tests are conducted to simulate a landing on Earth. Tests of physical work capacity and ability to maintain a vertical posture are also performed. Commenting on the findings obtained at the midpoint of the study, Grigoryev states that the new exercise regimen seems to hold promise for prevention of changes in the cardiovascular and metabolic systems. He also states that the drugs used in the study have been successful in combating changes in calcium metabolism.

Notably absent in the accounts of the experiment is any reference to a specific psychological support program for the subjects. Except for one telephone call per week no personal contact with family members is permitted during the experiment. Apart from the scheduled medical tests the 10 subjects are apparently left to spend their time as they wish—reading, studying, watching television, or conversing. The press commentaries refer only briefly to some difficulties of adjustment and personal conflicts among the subjects at the start of the experiment. Coincidentally, the 8 August issue of SOVETSKAYA ROSSIYA published excerpts from the diary of a participant in a similar type of experiment conducted by the Biomedical Problems Institute in 1967-68. This early experiment was a study of a closed environment life-support system rather than a hypokinesia experiment. However, the experiment required that three volunteer subjects spend a full year confined to two small experimental chambers. The published diary excerpts are noteworthy for their frank references to the psychological stress associated with living in the confined quarters and the deterioration in personal relationships which took place among the three individuals.

Recent Soviet statements at the 37th Congress of the International Astronautical Federation in Innsbruck reveal that extending the duration of manned space missions remains a prime objective of the Soviet program. The 11 October issue of the French journal AIR & COSMOS reports a statement at the congress by V. Ryumin, Soviet cosmonaut and flight controller, to the effect that the next cosmonaut manning of the Mir station will take place at the beginning of 1987 and is scheduled to last 10 months. Ryumin added that if there are no adverse effects on the cosmonauts after that period in orbit, still longer flights will be undertaken.

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CZECHOSLOVAKIA/USSR: CEMA FACTORY AUTOMATION

Key Points: Czechoslovakia and the USSR have placed new emphasis on ROBOT, an R&D organization tasked with the modernization of Czech and Soviet machining plants through innovative robot technology. More than a bilateral venture, ROBOT reportedly will play a major part in the CEMA plan to develop an integrated factory automation system.

Established in 1980, ROBOT encountered early financial setbacks resulting from an overly ambitious and poorly defined R&D program. However, with the intensified drive to improve CEMA industrial technology and production, Prague and Moscow have now moved to revitalize the organization through increased funds and staff. ROBOT, which is located at the Presov Pedagogical Faculty, is expected to have a staff of 170 (including 55 Soviet specialists) by the end of the year, according to the Bratislava daily PRAVDA of 19 September. Yevgeniy Kanayev, previously a department head at the Experimental Scientific Research Institute for Metalcutting in Moscow, will have a four-year term as deputy director general of ROBOT.

The organization is currently working on a streamlined R&D program that includes a flexible system for machining crankshafts, a combination system based on the SRT-32 lathe and the UM-160 robot, and a combination system based on the SN-400-1 foundry machine and the MRL-10 robot. ROBOT's top managers dismiss the notion of robots being able to do "anything and everything" as a myth propagated by the West, the PRAVDA article reported. They stated that the organization will emphasize an integrated approach in which equal importance is given robot, machine tool, automatic conveyor, and computer R&D.

Beyond its bilateral functions, ROBOT will operate within the broader CEMA organization INTERROBOT, which, according to the East Berlin journal AUSSENWIRTSCHAFT, coordinates CEMA robotics R&D and devises new technical concepts for industrial robot development. For example, as part of INTERROBOT's diversified efforts, the USSR will concentrate on the development of robots for metalworking and foundry work, Bulgaria on robots for application of coatings and for machine building and electronics assembly, and Poland on robots for welding. Czech R&D will focus on further development of robots for die casting and assembly.

Moreover, ROBOT will have a somewhat autonomous status in INTERROBOT that will allow Czechoslovakia to assign R&D work to other INTERROBOT members. As a result, INTERROBOT may be requested to conduct supporting research on Czech flexible manufacturing systems, machine tool centers, and robotized work stations.

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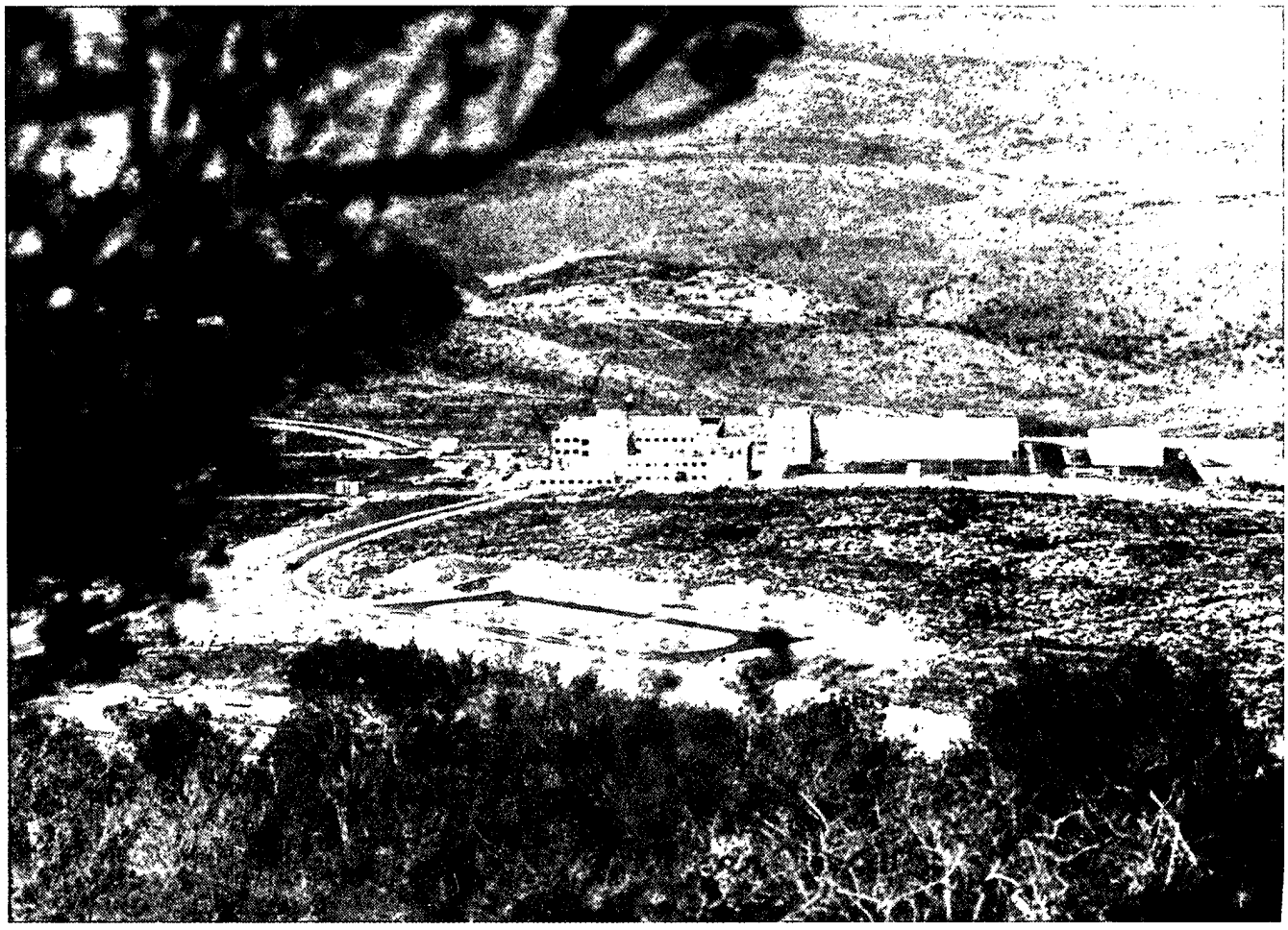
ISRAEL: SOLID STATE TECHNOLOGY FACILITY

Key Points: Israel has opened its first solid state electronics facility. Its laboratories and clean rooms reportedly will enable the Israelis to conduct advanced R&D on weapons and support systems.

The Israeli Armaments Development Authority (RAFAEL) has opened the country's first solid state electronics facility at the Leshem Industrial Institute in the Galilee. Although the Israeli Government has not publicized the opening, the Tel Aviv daily HA'ARETZ of 10 October claims that this facility puts Israel on a par with advanced industrial countries in its capability to develop sophisticated components for missile systems, night vision equipment, and electro-optical and electronic devices.

Designed with the help of US solid state electronics firms, the facility reportedly contains a "large number" of laboratories whose specific functions were not detailed in the HA'ARETZ report. Component assembly will be done in clean rooms that limit dust accumulation to a "few particles" per liter and whose temperature will be kept constant to within a half degree centigrade. Relative humidity in the clean rooms will not fluctuate more than 5 percent.

The Leshem Institute was established about two years ago by RAFAEL as part of the Jewish Agency's plan to industrialize the Galilee. The institute is located in an area of the Segev region which ensures controlled access and affords the installation ample space for expansion.



The Leshem Industrial Institute.

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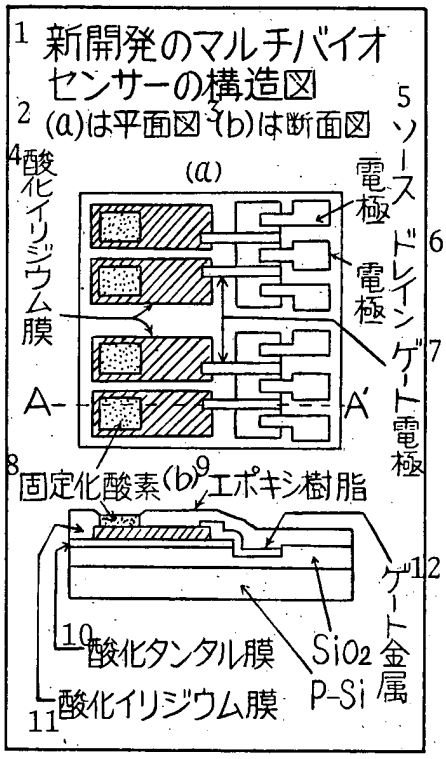
REPORTS

REPORTS surveys science and technology trends as detailed in articles, books, and journals. It also includes summaries and listings of articles and books which may serve as potential sources for future research. Conference proceedings will occasionally be presented in this section.

JAPAN: NEW MULTIBIOSENSOR

A new multibiosensor has been developed by a research team under Haruaki Katsube of Saitama University, according to NIHON KOGYO SHIMBUN of 3 September.

The biosensor was developed using a separated gate-type FET (field-effect transistor) with a thin immobilized film on the gate electrode. The new device has three sensors (for urea, glucose, and pH) mounted on a single-crystal silicon substrate. The sensor is one square centimenter in size.



1) Blueprint of new multibiosensor
2) Surface view
3) Cross-section
4) Iridium oxide film
5) Source terminal
6) Drain terminal
7) Gate electrode
8) Immobilized enzyme
9) Epoxy resin
10) Tantalum oxide film
11) Indium oxide film
12) Gate metal

The structure of the new multisensor eliminates the problem of component damage resulting from enzyme film corrosion. The porosity of immobilized enzyme film allows acids and alkalis to seep into the gate electrode. The new sensor prevents seepage through an arrangement that places the enzyme film

away from the gate electrode rather than directly on top of it. In the assembly process, the enzyme layer is mounted on a conductive iridium oxide film which is connected to the edge of the gate electrode. The sensor's components, except for the enzyme film, are then bonded with epoxy resin. Although the enzyme film remains exposed to moisture, its separation from the gate electrode protects the sensor's electronic components from damage.

In laboratory tests with the multibiosensor, urea and glucose levels have been measured in the 5-to-200-milligram range. The sensor provided consistently accurate data over a one-week evaluation period. The Katsube team hopes to use the sensor in blood chemistry procedures.

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JAPAN: LASER-ENRICHED URANIUM

The Japanese Government has turned to the private sector in an effort to close the gap with the US in laser-enriched uranium technology. Japanese scientists estimate that they are a decade behind their US counterparts in developing a laser enrichment technique that would halve the cost of current separating enrichment methods, the Tokyo press reported in September.

As a result, the Federation of Electric Power Companies on 17 September established a private research group called the Laser-Method Uranium Enrichment Technology Research Group (LUETRG). Prior to the LUETRG, government organizations such as the Science and Technology Agency were responsible for laser-enrichment technology. The new group is composed of Japan's nine major electric power companies and the Japan Atomic Power Company, the Central Research Institute for Electric Power, and the Japan Nuclear Fuel Industry Company.

The LUETRG will conduct a five-year development program that includes the building of a pilot production facility. The group has budgeted 20 billion yen for the research, half of which will be provided by the Ministry of International Trade and Industry (MITI).

The press provides only a broad outline of LUETRG's research schedule. Initially, the group will focus on the definition of a basic approach and then on equipment development. This phase is to be followed by the refinement of laser devices and the construction of separation chambers for the isotopic mixture. The final step involves the completion of equipment testing and an evaluation of test results. The objective of this R&D effort is the production of 1 to 5 tons SWU (separative work units, a measurement of work required to separate an isotopic mixture into a higher percentage and a lower percentage concentrate) per year by 1990.

The Tokyo press noted that Hitachi, Toshiba, and Ishikawajima Harima Heavy Industry also have been developing laser equipment for uranium enrichment. Moreover, the Sumitomo Metal Mining Company is developing an enrichment method using a company-manufactured YAG laser. The Japan Atomic Energy Research Institute reportedly will begin work on a sophisticated free-electron laser (FEL) for use in uranium enrichment.

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DATA BASE SURVEYS

DATA BASE SURVEYS presents an annotated list of documents compiled by the FBIS Antwerp and Milan S&T Units from searches of European commercial data bases on specific technical topics suggested by consumer requirements. Additional searches and full-text translations of the documents cited below can be provided on request.

The following list is the result of a Milan Unit search of SIGLE—a database containing bibliographic references to grey literature from European Community countries and Sweden—for FRG documents on government-sponsored advanced technology research.

TOPIC & ORGANIZATION	DESCRIPTIVE
AEROSPACE	
BMFT (Federal Ministry for Research and Technology)	Conference papers from the April 1986 "BMFT Status Seminar on Aerospace Science and Technology" highlight leading-edge European space research.
ADVANCED MATERIALS	
BMFT/Daimler Benz	Phase 3 of the "Ceramic Components, Gas Turbines" project is described in a June 1986 research report.
BMFT/Motoren und Turbinen Union	A February 1986 paper entitled "Advanced Development of Diffusion Bonding—Process for Joining Turbine Blades with Complex Cooling Configuration and Other Near Net-Shape Components: Final Report" explores FRG efforts in a field that has applications in aeronautical and automotive technology.
BMFT/Fraunhofer Institute for Applied Solid State Physics	A 100-page, 1986 report examines the findings of the the multiyear program "Liquid Crystal Materials and Electrooptic Effects for High Information Content Displays."
REMOTE SENSING	
BMFT	The proceedings of the January 1986 BMFT seminar "Utilization of Remote Sensing Data in the Federal Republic of Germany" demonstrate the wide range of applications for remote sensing technology in the FRG.
PLANS AND PROGRAMS	
BMFT	BMFT funding, personnel, and research are detailed in the "Proceedings of the BMFT Status Seminar 28-30 April 1986."
Fraunhofer Association	This March 1986 document presents the official 1986 research plan of the Fraunhofer Association.

Milan Unit [redacted] STAT

PREVIEWS

PREVIEWS is an annotated list of selected science and technology items being translated by FBIS. The list may also contain previously published items of wide consumer interest.

EUROPE REPORT: SCIENCE AND TECHNOLOGY

BRITE: BASIC RESEARCH IN INDUSTRIAL TECHNOLOGIES FOR EUROPE

Official EC information package on BRITE program for 1985-89. Details conditions for participation, principles governing contracts, and financing procedures. Included is a list of the 95 projects and the companies involved. (Brussels PRESS RELEASE BRITE 4 Feb 86 and 19 Jun 86; Brussels INFORMATION PACKAGE FOR THE SECOND CALL FOR PROPOSALS FOR THE EUROPEAN COMMUNITY PROGRAM BRITE 1986). Published in EUROPE REPORT: SCIENCE AND TECHNOLOGY, 15 Oct 86.

EURAM: EUROPEAN RESEARCH ON ADVANCED MATERIALS

Official EC publication on advanced materials research in the EURAM program. Outlines purpose of project and research topics, which include metallic materials, engineering ceramics, and composites. (Brussels RESEARCH ACTION PROGRAMME MATERIALS IV. ADVANCED MATERIALS 1985; Brussels Supplement to OFFICIAL JOURNAL OF THE EUROPEAN COMMUNITIES 19 Jun 86). Published in EUROPE REPORT: SCIENCE AND TECHNOLOGY, 17 Oct 86.

EC SELECTS PROJECTS, PREPARES PHASE II OF ESPRIT

Responsibilities within the EC for various aspects of ESPRIT program; excerpts from evaluation report issued in October 1985 by an independent panel of experts giving recommendations for Phase II and citing project statistics for Phase I. (Bonn DAS PARLAMENT 16-23 Aug 86; Brussels ZWISCHENBEWERTUNG VON ESPRIT 15 Oct 85)

FINNISH ISO SYSTEM TO ACCESS EUREKA DATA BASES

FUNET (Finnish University and Research Network) has received from Digital Equipment Corporation as a gift an ISO (International Organization for Standardization) information system. The article examines how the system will allow information sharing with other Eureka participants and computer-to-computer data transfer for file updating. (Helsinki HELSINGIN SANOMAT 25 Sep 86 p 17)

FRENCH PLANNING OFFICE PROPOSES MEASURES TO BOOST NEW TECHNOLOGIES

The article discusses the 83 proposals made by the French General Planning Commission to promote new technologies in France. The technological fields studied are microelectronics, microcomputing, new materials, and biotechnology. (Paris LE MONDE INFORMATIQUE 6 Oct 86 p 74)

FRENCH AI ACHIEVEMENTS WITH LISP, PROLOG, MAIA

This overview describes various versions of the Lisp and Prolog families being developed in France. It also outlines French research efforts to develop computers supporting AI applications. (Paris SCIENCES & TECHNIQUES Oct 86 pp 41-50)

FRENCH CNET DEVELOPING NEW OPTICAL FIBER TECHNOLOGY

CNET has developed an all-French prototype machine to draw various optical fibers to manufacture cable in one continuous process. The article describes the technical aspects of the process. (Paris SCIENCES & TECHNIQUES Oct 86 pp 13-14)

FRANCE EXPLAINS REFORMS IN CNRS; MILITARY, CIVIL R&D BUDGET FOR 1987

Series of articles on "fundamental research" as the priority of the CNRS and on the new system of managing the military and civil R&D budget through the minister of finance. Breakdown of the finalized 1987 French R&D budget is included. (Paris AFP SCIENCES 9 Oct pp 1-6; Paris LIBERATION 10 Oct p 39; Paris LE MONDE 11 Oct p 10)

FRAUNHOFER OFFICIAL CRITICIZES FRG PLAN FOR MANNED SPACE MISSIONS

Helmar Krupp, a professor at the Fraunhofer Institute for Systems Technology and Innovative Research, argues that manned space missions are "absurd" and urges the FRG to reject them. He discusses manned microgravity research and industrial production in space and addresses the subject of civilian spinoffs of "premilitary" space research. (Munich INDUSTRIEMAGAZIN Oct 86 pp 19-20)

LATIN AMERICA REPORT

RIO HOLDS SIXTH BRAZILIAN COMPUTER FAIR

Extensive coverage of exhibits gives overview of domestically manufactured hardware and software. Major exhibits are described and evaluated. (Rio de Janeiro DATA NEWS 9 Sep 86 pp 6-20)

WORLDWIDE REPORT: TELECOMMUNICATIONS POLICY, RESEARCH, AND DEVELOPMENT

EFFECTS OF CGE-ITT DEAL ON TELECOMMUNICATIONS MARKET ACCESS, COMPETITION

Series of articles maps CGE takeover of ITT; provides an interview with new CGE Chief Pierre Suard in which he discusses company strategy; and looks at the reaction of other West European telecommunications firms (such as Siemens, Ericsson, Italtel, and Plessey) to the takeover. (Munich INDUSTRIEMAGAZIN Oct 86 pp 27-49)